National Health Care Safety Network

A System for Infection Prevention and Control

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Objectives

By the end of the presentation you should be able to:

- State the purposes of NHSN
- Describe the types of healthcare-associated infection (HAI) surveillance which can be accomplished through NHSN
- State at least 2 advantages of participation in NHSN for your facility
- Identify at least 1 type of analysis which might be useful for your facility related to quality improvement, legislative or regulatory requirements

What is NHSN?

- Internet-based
- Voluntary (?)
- Secure
- System of surveillance for healthcare-associated infections (HAIs)

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Confidentiality in NHSN

- Public Health Service Act (42 USC 242b, 242k, and 242m(d))
- Confidentiality Protection
  - Sections 304, 306, and 308(d) of the PHS Act

"The information contained in this surveillance system that would permit identification of any individual or institution is collected with a guarantee that it will be held in strict confidence, will be used only for the purposes stated, and will not be disclosed or released without the consent of the individual, or the institution in accordance with Sections 304, 306, and 308(d) of the Public Health Service Act (42 USC 242b, 242k, and 242m(d))."

Purposes of NHSN

- Collect data from a sample of US healthcare facilities to permit valid estimation of the
  - magnitude of adverse events among patients and healthcare personnel
  - adherence to practices known to be associated with prevention of healthcare-associated infections (HAI)
- Analyze and report collected data to permit recognition of trends

Purposes of NHSN

- Provide facilities with risk-adjusted data that can be used for inter-facility comparisons and local quality improvement activities
- Assist facilities in developing surveillance and analysis methods that permit timely recognition of patient and healthcare personnel safety problems and prompt intervention with appropriate measures
- Conduct collaborative research studies with members

What Isn't NHSN?

- Program to guide clinical decision making
- Guideline development body
- An answer to every surveillance need

What and When States Using NHSN are Reporting (n=20)

NY VT SC CO TN CT PA CA MD DE MA OK VA WA IL NH OR NJ WV NV

Jan 2007 *Jan 2008* *Jan 2009*

CLABSI	CA, CO, CT, DE, IL, MA, MD, NH, NJ, NY, OK, OR, PA, SC, TN, VA, VT, WA, WV
CAUTI	PA
SSI	CO, MA, NH, NJ, NY, OR, PA, SC, TN, VT
VAP	NH, OK, PA, WA
Dialysis events	CO
CLIP	CA, NH
MDRO	Many states are considering, but none have mandated
HCW influenza vaccination*	DE, MA, MD, NJ, WV

* *Available Summer 2009*

As of 6/18/2009

Components of NHSN

- Patient Safety
- Healthcare Personnel Safety
- Biovigilance
- Research and Development

Patient Safety Component Modules

Device-associated	•CLABSI •CAUTI •DE •CLIP •VAP
Procedure-associated	• SSI • PPP
Medication-associated	• AUR Pharmacy • AUR Microbiology
MDRO/CDAD	•MDRO/CDAD Infection •LabID •Processes
Patient Influenza Immunization	•Method A •Method B

Device-associated Modules

- Central Line-associated Bloodstream Infections (CLABSI)
- Central Line Insertion Practices (CLIP)
- Catheter-associated Urinary Tract Infections (CAUTI)
- Ventilator-associated Pneumonia (VAP)
- Dialysis Event (DE)

Healthcare-associated Infection (HAI)

- A localized or systemic condition resulting from an adverse reaction to the presence of an infectious agent(s) or its toxin(s)
  - There must be no evidence that the infection was present or incubating at the time of admission
  - Occurs in a patient in a healthcare setting and
- When the setting is a hospital, meets the criteria for a specific infection (body) site as defined by CDC
- When the setting is a hospital, may also be called a nosocomial infection

Horan TC, Andrus ML, Dudeck MA. CDC/NHSN surveillance definition of healthcare-associated infection and criteria for specific types of infections in the acute care setting. *Am J Infect Control* 2008;36:309-32. ***(Chapter 17 NHSN manual)***

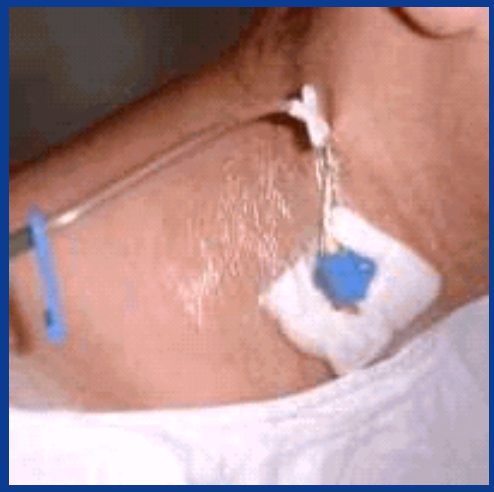
HAI

- The following infections are not considered healthcare associated:
  - Infections associated with complications or extensions of infections already present on admission, unless a change in pathogen or symptoms strongly suggests the acquisition of a new infection
  - Infections in infants that have been acquired transplacentally & become evident ≤ 48 hours after birth (i.e. rubella, CMV)
  - Reactivation of a latent infection (i.e. h. zoster)

Horan TC, Andrus ML, Dudeck MA. CDC/NHSN surveillance definition of healthcare-associated infection and criteria for specific types of infections in the acute care setting. *Am J Infect Control* 2008;36:309-32.

Central Line-associate Bloodstream Infections (CLABSI) Module

- 250,000 CLABSIs occur in the United States each year[1]
- Most bloodstream infections are associated with the presence of a central line or umbilical catheter (in neonates) at the time of or before the onset of the infection
- Estimated mortality is 12-25% for each CLABSI[1]



Cost to the healthcare system est. $34,000-$56,000/CLABSI

$296 mil- $2.3 bil. → in US/year[2,3,4]

NHSN Definition: CLABSI

- Central Line-Associated Bloodstream Infection (CLABSI) is a primary bloodstream infection (BSI) in a patient that had a central line *within* the 48-hour period before the development of the BSI
- If the BSI develops in a patient within 48 hours of discharge from a location, indicate the discharging location on the infection report

NOTE: There is no minimum time period that the central line must be in place in order for the BSI to be considered central line-associated.

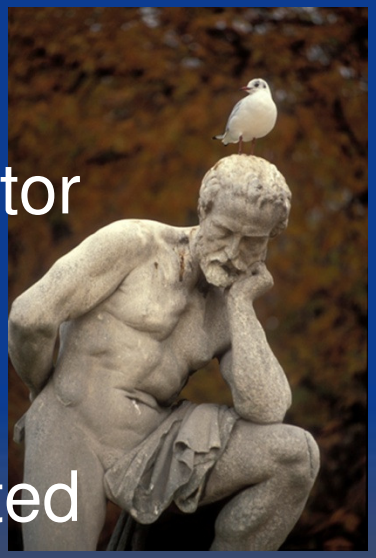
Bloodstream Infection Definitions Summary

- **Laboratory confirmed bloodstream infection (LCBI) – all patients**
  1. Any patient: ≥ 1 blood culture with pathogen
  2. Any patient: ≥2 blood cultures drawn on separate occasions positive with same skin organism + fever, chills, OR hypotension
  3. Infant/neonate: ≥2 blood cultures drawn on separate occasions positive with same skin organism + fever, hypothermia, apnea, OR bradycardia
- **Clinical Sepsis (CSEP) – infants and neonates only**

  Clinical symptoms + blood culture not done or negative + antimicrobial therapy instituted

Further NHSN CLABSI Clarifications

- Definition of central line
  - IV catheter ends at or close to great vessel: infusion, blood withdrawal, hemodynamic monitor
- Types of CLs:
  - Temporary- non-tunneled
  - Permanent- tunneled or implanted

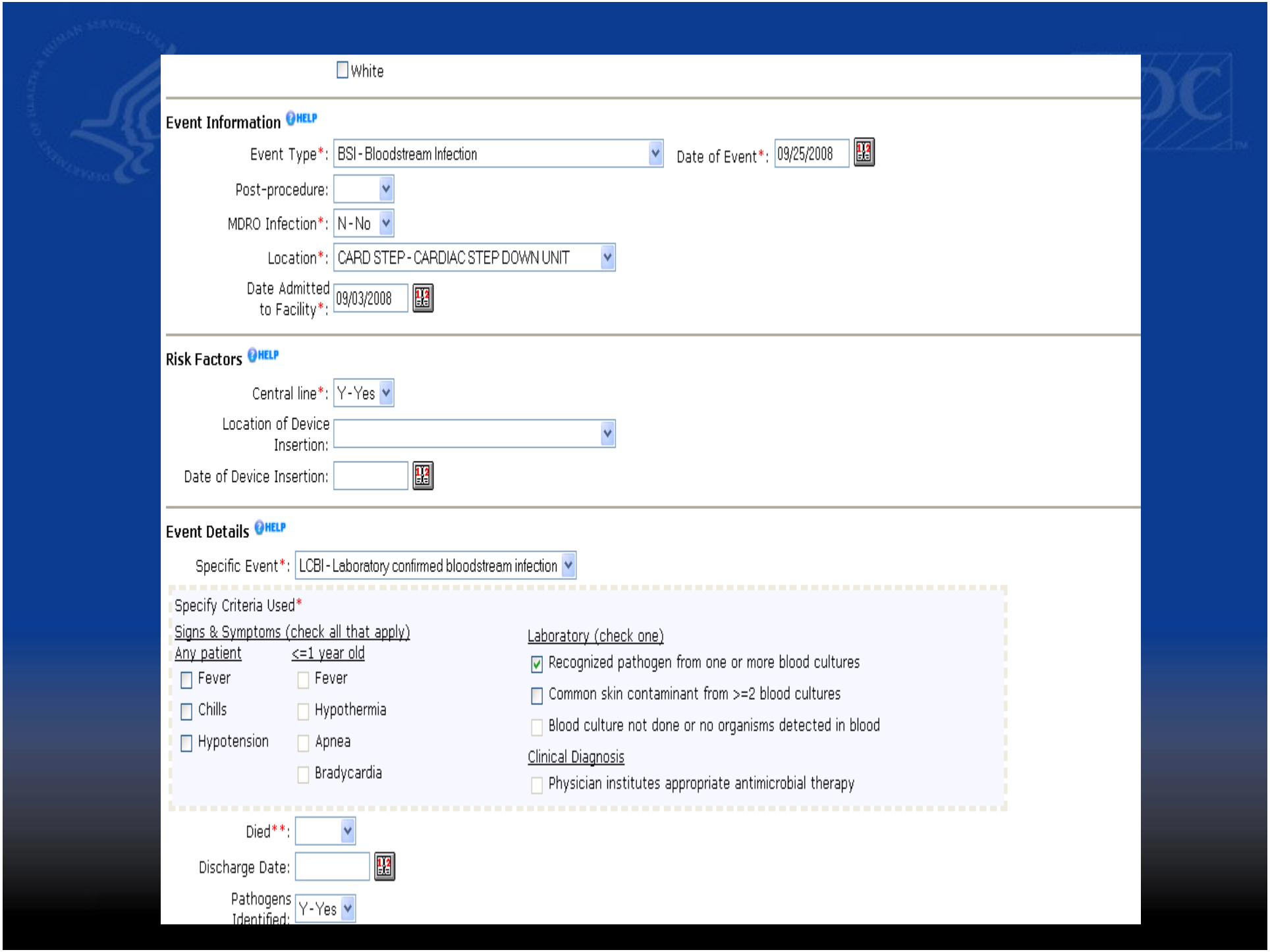


Much more detail can be found in the NHSN manual on the website

Further NHSN CLABSI Clarifications

- Location of Attribution
  - First evidence of infection
  - 48-hour rule
- Timing issues
  - Common skin contaminants: within 2 days of each other
- "Sameness of organism"

Much more detail can be found in the NHSN manual on the website


White
Event Information HELP
Event Type*: BSI - Bloodstream Infection
Date of Event*: 09/25/2008
Post-procedure:
MDRO Infection*: N - No
Location*: CARD STEP - CARDIAC STEP DOWN UNIT
Date Admitted to Facility*: 09/03/2008
Risk Factors HELP
Central line*: Y - Yes
Location of Device Insertion:
Date of Device Insertion:
Event Details HELP
Specific Event*: LCBI - Laboratory confirmed bloodstream infection
Specify Criteria Used*
Signs & Symptoms (check all that apply)
Any patient
Fever
Chills
Hypotension
<=1 year old
Fever
Hypothermia
Apnea
Bradycardia
Laboratory (check one)
Recognized pathogen from one or more blood cultures
Common skin contaminant from >=2 blood cultures
Blood culture not done or no organisms detected in blood
Clinical Diagnosis
Physician institutes appropriate antimicrobial therapy
Died**:
Discharge Date:
Pathogens Identified: Y - Yes

Pathogens HELP

Pathogen 1: SA - Staphylococcus aureus Search 10 drugs required

	Drug	Result
>	CLIND - Clindamycin	S - Susceptible
>	DAPTO - Daptomycin	S - Susceptible
>	ERYTH - Erythromycin	R - Resistant
>	GENT - Gentamicin	R - Resistant
>	LNZ - Linezolid	S - Susceptible
>	OX - Oxacillin	S - Susceptible
>	QUIDAL - Quinupristin/dalfopristin	S - Susceptible
>	RIF - Rifampin	S - Susceptible
>	TMZ - Trimethoprim/sulfamethoxazole	R - Resistant
>	VANC - Vancomycin	S - Susceptible

Add Row

Pathogen 2: Search

Pathogen 3: Search

Example of Completed Denominators for ICU/Other Locations Form

NHSN National Healthcare Safety Network

Denominators for Intensive Care Unit (ICU)/ Other locations (not NICU or SCA)

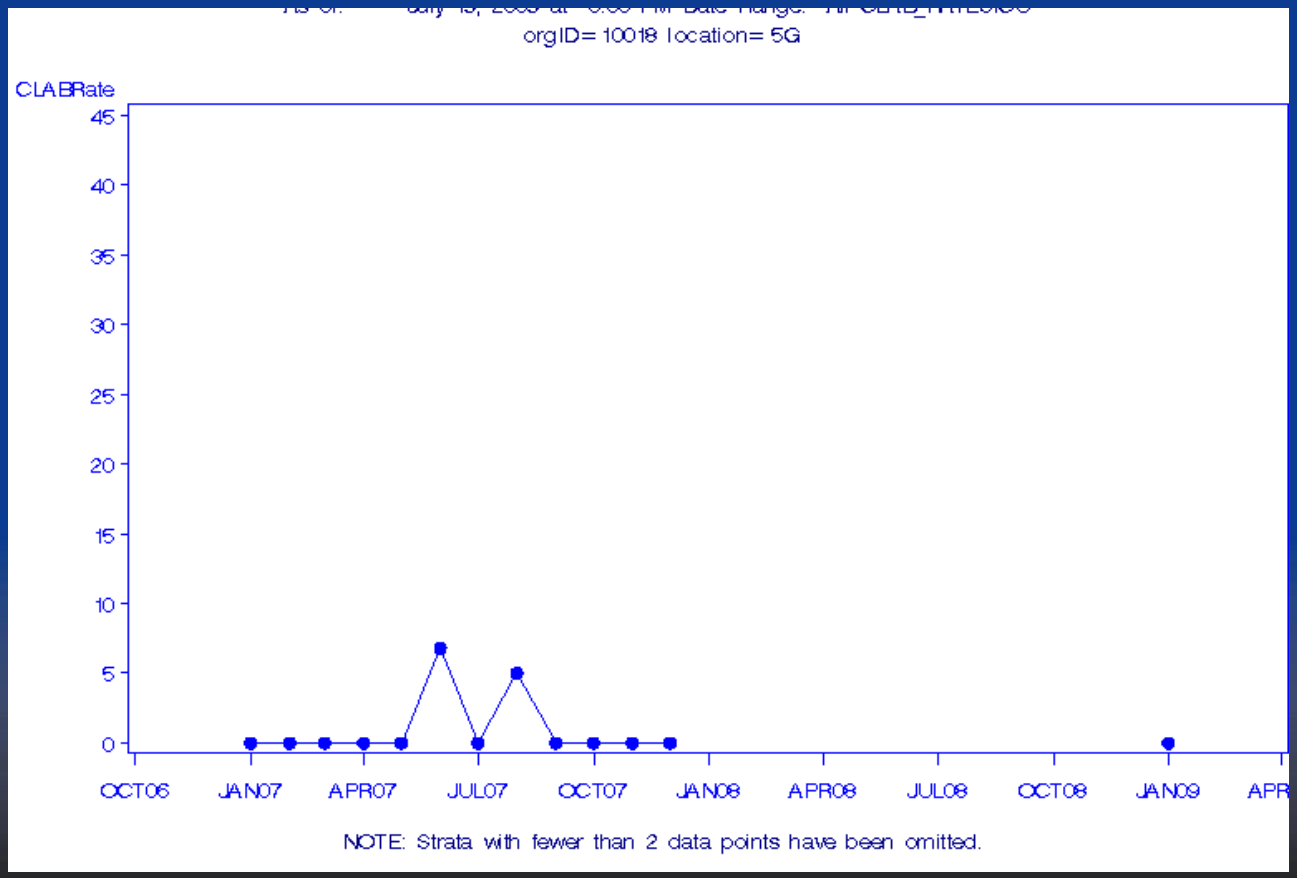
OMB No. 0920-0666
Exp. Date: 02-29-2008

* required for saving

*Facility ID# **10000** *Month: **Nov** *Year: **2008** *Location Code: **MSICU**

Date	*Number of patients	**Number of patients with 1 or more central lines	**Number of patients with a urinary catheter	**Number of patients on a ventilator
1	6	6		
2	8	6		
3	6	4		
4	7	7		
5	6	6		
6	8	6		
7				
8				
9				
10				
11				
31	//	//		
*Totals	151	138		
	Patient-days	Central-line days	Urinary catheter-days	Ventilator-days

CLABSI Analysis

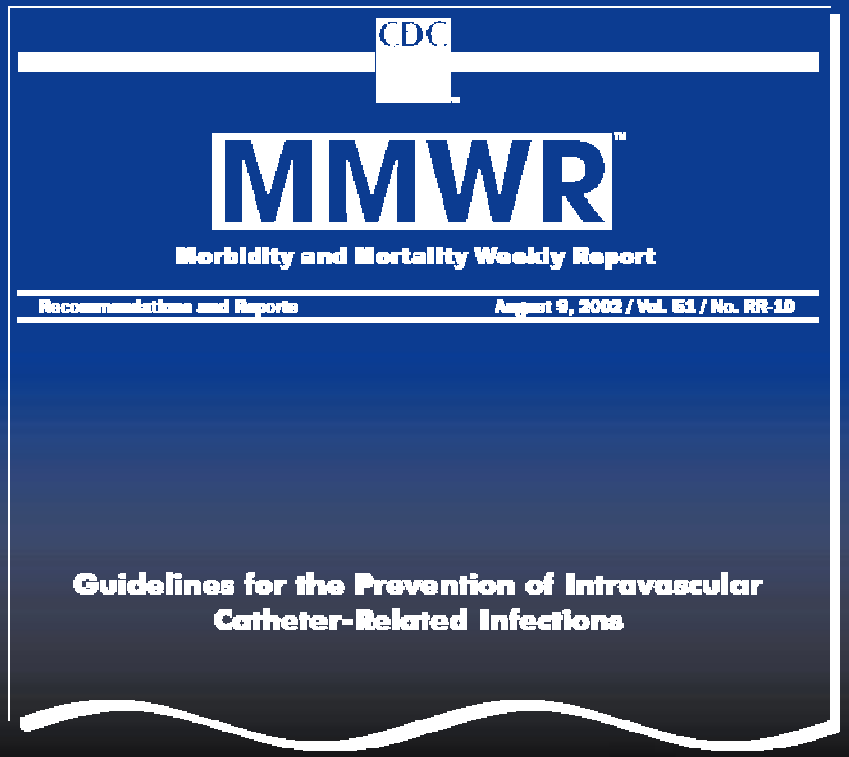


- **Frequency Tables**
- **Rate Tables**
- **Line Lists**
- **Charts**

Central Line Insertion Practices (CLIP) Module

Central line-associated bloodstream infections (CLABSIs) can be prevented through proper management of the central line.

CDC's HICPAC *Guideline for the Prevention of Intravascular Catheter-Related Infections* recommends evidence-based central line insertion practices known to reduce the risk of CLABSI.



CLIP

Recommendations from the Guideline include:

- Use of maximal sterile barriers during insertion
- Proper use of a skin antiseptic prior to insertion
- Avoiding the femoral insertion site whenever possible
- Avoiding guidewire exchange when a CLABSI is suspected

Reporting information about the above practices in NHSN will enable facilities and CDC to:

- Monitor central line insertion practices in individual patient care units and facilities to provide aggregate adherence data
- Link gaps in recommended practice with the clinical outcome (i.e., CLABSI data)
- Facilitate quality improvement by identifying specific gaps in adherence to recommended prevention practices, helping to target intervention strategies to reduce CLABSI rates

Event Information HELP

Event Type*: CLIP - Central Line Insertion Practices

Location*: 71ICU - 71 ICU CARDIAC

Date of Insertion*: 04/25/2009

Person recording insertion practice data>: ○ Inserter ◉ Observer

Central Line Inserter ID: [ ] Find HCW

Last Name: [ ] First Name: [ ]

Occupation of inserter>: RES - Intern/Resident

Insertion Details HELP

Reason for insertion>: NEWIND - New indication for central line

Inserter performed hand hygiene prior to central line insertion>: Y - Yes

Maximal sterile barrier precautions used>:

- Mask: Y - Yes
- Sterile gown: Y - Yes
- Large sterile drape: Y - Yes
- Sterile gloves: Y - Yes
- Cap: N - No

Skin Preparation (check all that apply)>: ☑ Chlorohexidine gluconate ☐ Povidone iodine ☐ Alcohol

Was skin preparation agent completely dry at the time of first skin puncture?>: Y - Yes

Insertion site>: SUBCLAVIAN - Subclavian

Antimicrobial coated catheter used: N - No

Central line catheter type>: NONTUNN - Non-tunneled (other than dialysis)

Number of lumens>: 2

Central line exchanged over a guidewire>: N - No

Antiseptic ointment applied to site>: Y - Yes

CLIP Analysis Outputs

National Healthcare Safety Network

Line Listing for All Central Line Insertion Practices Events

As of: January 17, 2008 at 7:03 AM

Date Range: All CLIP_EVENTS

Patient ID	Location	Insertion Date	Insertion Site	Hand Hygiene Performed ?	Barrier Used: Gloves?	Barrier Used: Drape?
005-04	SICU	2007-03-06	SUBCLAVIAN	Y - Yes	Y - Yes	Y - Yes
122-500	72ORTHO	2007-05-14	FEMORAL	Y - Yes	N - No	Y - Yes
5464646	5G	2007-11-15	SUBCLAVIAN	Y - Yes	Y - Yes	Y - Yes
52432154	5G	2007-11-15	JUGULAR	Y - Yes	Y - Yes	N - No
00-00-000	72ORTHO	2007-06-29	JUGULAR	Y - Yes	Y - Yes	N - No
58-74-11	ED	2007-07-01	FEMORAL	Y - Yes	Y - Yes	Y - Yes
16-336-08	ED	2007-07-02	JUGULAR	Y - Yes	Y - Yes	Y - Yes
16-333-0	5G	2007-03-12	SUBCLAVIAN	Y - Yes	Y - Yes	N - No
00-14-228	5G	2007-03-21	SUBCLAVIAN	Y - Yes	Y - Yes	N - No
00-123-45	61EAST	2007-09-10	JUGULAR	Y - Yes	Y - Yes	Y - Yes
00-01-235	61EAST	2007-09-16	SUBCLAVIAN	Y - Yes	Y - Yes	N - No
26-23-55	61EAST	2007-09-21	JUGULAR	Y - Yes	Y - Yes	Y - Yes
20-00-200	61EAST	2007-09-12	PICC	Y - Yes	Y - Yes	Y - Yes
85-88-86	61EAST	2007-09-04	PICC	Y - Yes	Y - Yes	Y - Yes
11-444-7	61EAST	2007-09-06	JUGULAR	Y - Yes	Y - Yes	N - No
14-14-774	BMT	2007-04-04	SUBCLAVIAN	Y - Yes	Y - Yes	Y - Yes
071-17-77	BMT	2007-04-23	SUBCLAVIAN	Y - Yes	Y - Yes	N - No
00-18-885	BMT	2007-04-16	JUGULAR	Y - Yes	Y - Yes	Y - Yes
11-12-669	BMT	2007-04-09	FEMORAL	Y - Yes	Y - Yes	N - No
11-966-39	BMT	2007-04-28	JUGULAR	Y - Yes	Y - Yes	Y - Yes

Line Listing

CLIP Analysis Cont.

Location	Hand Hygiene Count	CLIP Count	Hand Hygiene Rate
5G	4	4	100.0

$$\text{Hand Hygiene Adherence Rate} = \frac{\text{\# hand hygiene done}}{\text{\# CLIPs done}} \times 100$$

Location	Skin Prep Count	CLIP Count	Skin Prep Rate
5G	3	4	75.0

$$\text{Skin Prep Adherence Rate} = \frac{\text{\# skin preps done}}{\text{\# CLIPs done}} \times 100$$

Process Adherance Rates

CLIP Analysis Cont.

- Adherence to
  - Hand hygiene
  - Protective sterile barriers
  - Appropriate antiseptic skin prep
  - Skin prep dry at insertion

NHSN

BUNDLE

orgID=10018 locCDC=IN:ACUTE:CC:M_PED

summaryYM	location	occCDC	bundleCount	CLIPCount	bundle_adhRate
2007M09	61EAST	IVT	2	2	100
2007M09	61EAST	PAS	0	1	0
2007M09	61EAST	PHY	0	3	0

Bundle Adherance Rate = # Insertions with Y to all 4 above / # Insertions

Ventilator-associated Pneumonia Module

Pneumonia:

- HAI type (3rd)
- 3.3% in ICUs (2nd)
- HAI related mortality (1st)

Klevens M, Edwards J, et al. *Public Health Reports*. 2002;122

Pneumonia in NHSN

PNU3	Pneumonia in immunocompromised patient
PNU2	Pneumonia with specific laboratory findings
PNU1	Clinically defined pneumonia

http://www.cdc.gov/nhsn/PDFs/pscManual/17pscNosInfDef_current.pdf

PNU1: Clinically Defined - Any Patient

X-Ray findings:

Patient **with underlying diseases** has **2 or more serial X-rays** with **one** of the following:

- ☐ New or progressive and persistent infiltrate
- ☐ Consolidation
- ☐ Cavitation
- ☐ Pneumatoceles, in ≤1 y.o.

OR

AND →

Patient **without underlying diseases** has **1 or more serial X-rays** with **one** of the following:

- ☐ New or progressive and persistent infiltrate
- ☐ Consolidation
- ☐ Cavitation
- ☐ Pneumatoceles, in ≤1 y.o.

Reminder!

Always begin by reviewing chest xray findings.

Notes about Chest X-ray Evidence

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- In patients with pulmonary or cardiac disease, the diagnosis of pneumonia may be difficult.
- In these difficult cases, serial chest x-rays must be examined to help separate infectious from non-infectious causes (e.g, pulmonary edema).

** Pneumonia may have rapid onset and progression, but it does not resolve quickly.*
** X-ray changes of pneumonia persist for several weeks.*
** If the x-ray changes resolve quickly, it suggests that the patient does not have pneumonia, but rather a non-infectious process.*

Notes about Chest X-ray Evidence

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There are many ways of describing pneumonia on a chest x-ray...

focal opacification

air space disease

patchy areas of increased density

In addition to infiltrate, consolidation, cavitation and pneumatoceles (in <1 y.o), these descriptive words should be considered as potentially positive findings.

PNU1: Clinically Defined - Any Patient

Signs and symptoms:

At least **one** of the following:

- ☐ Fever (> 38° C/100.4° F) with no other cause
- ☐ Leukopenia (< 4,000 WBC/mm³) or leukocytosis (≥ 12,000 WBC/mm³)
- ☐ Altered mental status with no other cause, in ≥ 70 y.o.

AND

At least **two** of the following:

- ☐ New onset of purulent sputum, or change in character of sputum, or ↑ respiratory secretions, or ↑ suctioning requirements
- ☐ New onset or worsening cough, or dyspnea, or tachypnea
- ☐ Rales or bronchial breath sounds
- ☐ Worsening gas exchange (e.g., O_2 desats [e.g., $PaO_2/FiO_2 \leq 240$], ↑ O_2 req, or ↑ ventilation demand)

PNU1: Clinically Defined - Alternate Criteria for Infants & Children

Signs & Symptoms

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Infants ≤ 1 y.o.

- ❑ Worsening gas exchange (e.g., O_2 desats [e.g., pulse oximetry <94%], ↑ O_2 req, or ↑ ventilation demand)

and **three** of the following:

- ❑ Temperature instability with no other recognized cause
- ❑ Leukopenia (< 4,000 WBC/mm³) or leukocytosis (≥ 15,000 WBC/mm³) and left shift (≥ 10% band forms)
- ❑ New onset of purulent sputum, or change in character of sputum, or ↑ respiratory secretions, or ↑ suctioning requirements
- ❑ Apnea, tachypnea, nasal flaring with retraction of chest wall or grunting
- ❑ Wheezing, rales, or rhonchi
- ❑ Cough
- ❑ Bradycardia (<100 beats/min.) or tachycardia (> 170 beats/min.)

OR →

PNU1: Clinically Defined - Alternate Criteria for Infants & Children

Signs & Symptoms, continued

Children >1 or ≤ 12 y.o.

At least **three** of the following:

- ❑ Fever (>38.4° C/101.1° F) or hypothermia (< 36.5° C/97.7°F) with no other recognized cause
- ❑ Leukopenia (< 4,000 WBC/mm³) or leukocytosis (≥ 15,000 WBC/mm³)
- ❑ New onset of purulent sputum, or change in character of sputum, or ↑ respiratory secretions, or ↑ suctioning requirements
- ❑ New onset or worsening cough, or dyspnea, apnea, or tachypnea
- ❑ Rales or bronchial breath sounds
- ❑ Worsening gas exchange (e.g., O_2 desats [e.g., pulse oximetry < 94%], ↑ O_2 req, or ↑ ventilation demand)

PNU2:

X-ray criteria are exactly the same as for PNU1

Patient **with underlying diseases** has **2 or more serial X-rays** with **one** of the following:

- ☐ New or progressive and persistent infiltrate
- ☐ Consolidation
- ☐ Cavitation
- ☐ Pneumatoceles, in ≤1 y.o.

OR

Patient **without underlying diseases** has **1 or more serial X-rays** with **one** of the following:

- ☐ New or progressive and persistent infiltrate
- ☐ Consolidation
- ☐ Cavitation
- ☐ Pneumatoceles, in ≤1 y.o.

AND 

PNU2 -

Signs and symptoms:

At least **one** of the following:

- ☐ Fever (> 38° C/100.4° F) with no other cause
- ☐ Leukopenia (< 4,000 WBC/mm³) or leukocytosis (≥ 12,000 WBC/mm³)
- ☐ Altered mental status with no other cause, in ≥ 70 y.o.

AND

At least **one** of the following:

- ☐ New onset of purulent sputum, or change in character of sputum, or ↑ respiratory secretions, or ↑ suctioning requirements
- ☐ New onset or worsening cough, or dyspnea, or tachypnea
- ☐ Rales or bronchial breath sounds
- ☐ Worsening gas exchange (e.g., O_2 desats [e.g., $PaO_2/FiO_2 \leq 240$], ↑ O_2 req, or ↑ ventilation demand)

AND

PNU2 - Specific Laboratory Findings

Laboratory:

At least **one** of the following:

- ❑ Positive blood culture not related to another infection
- ❑ Positive pleural fluid culture
- ❑ Positive quantitative culture from minimally contaminated LRT specimen (e.g., BAL or protected specimen brushing)
- ❑ ≥ 5% BAL-obtained cells contain intracellular bacteria on direct microscopic exam
- ❑ Histopathologic exam shows **one** of the following:
  - Abscess formation or foci of consolidation with intense PMN accumulation in bronchioles and alveoli
  - Positive quantitative culture of lung parenchyma
  - Evidence of lung parenchyma invasion by fungal hyphae or pseudohyphae

OR

At least **one** of the following:

- ❑ Positive culture of virus or *Chlamydia* from respiratory secretions
- ❑ Positive detection of viral antigen or antibody from respiratory secretions (e.g., EIA, FAMA, shell vial assay, PCR)
- ❑ 4-fold rise in paired sera (IgG) for pathogen (e.g., Influenza viruses, *Chlamydia*)
- ❑ Positive PCR for *Chlamydia* or *Mycoplasma*
- ❑ Positive micro-IF test for *Chlamydia*
- ❑ Positive culture or micro-IF of *Legionella* spp from respiratory secretions or tissue
- ❑ Detection of *Legionella pneumophila* serogroup 1 antigens in urine by RIA or EIA
- ❑ 4-fold rise in *L. pneumophila* antibody titer to ≥ 1:128 in paired acute and convalescent sera by indirect IFA

PNU3- Immunocompromised Patient

X-ray criteria are exactly the same as for PNU1 and PNU2.

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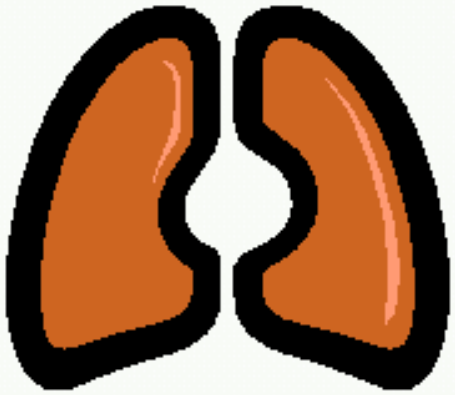
- Immunocompromised patients include those with
  - Neutropenia (absolute neutrophil count <500/mm^3), leukemia, lymphoma, HIV with CD-4 count <200, or splenectomy



- Those who are early post-transplant, are on cytotoxic chemotherapy, or are on high dose steroids
  - >40 mg of prednisone or its equivalent (>160 mg hydrocortisone, >32 mg methylprednisolone, >6 mg, 6 mg dexamethasone, >200 mg cortisone) daily for >2 weeks)

PNU3- Immunocompromised Patient

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Signs and symptoms:

At least **one** of the following in an **immunocompromised patient**:

- ☐ Fever (> 38° C/100.4° F) with no other cause
- ☐ Altered mental status with no other cause, in ≥ 70 y.o.
- ☐ New onset of purulent sputum, or change in character of sputum, or ↑ respiratory secretions, or ↑ suctioning requirements
- ☐ New onset or worsening cough, or dyspnea, or tachypnea
- ☐ Rales or bronchial breath sounds
- ☐ Worsening gas exchange (e.g., O_2 desats [e.g., PaO_2/FiO_2 < 240], ↑ O_2 req, or ↑ ventilation demand)
- ☐ Hemoptysis
- ☐ Pleuritic chest pain

AND →

PNU3- Immunocompromised Patient

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Laboratory:

At least **one** of following:

- ☐ Matching positive blood and sputum cultures with *Candida* spp
- ☐ Evidence of fungi or *Pneumocytis carinii* from minimally contaminated LRT specimen (e.g., BAL or protected specimen brushing) from **one** of the following:
  - Direct microscopic exam
  - Positive culture of fungi

OR

Any of the laboratory criteria from PNU2

Acceptable Specimens for PNU2 and PNU3

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- Quantitative culture from minimally contaminated LRT specimen
  - Obtained with or without bronchoscope
    - Bronchoalveolar lavage (BAL)
    - Protected specimen brushing
- Lung parenchyma
  - Open lung biopsy specimens
  - Immediate post-mortem specimens obtained by transthoracic or transbronchial biopsy

Ventilator –Associated Pneumonia (VAP) Surveillance

- Possible Uses:
  - VAP rates pre and post bundle implementation
  - Identification of pathogen trends
  - Device utilization rates

Catheter-associated Urinary Tract Infection (CAUTI) Surveillance

- Most common HAI
- Renewed interest:
  - Mandatory reporting
  - Denial of CMS reimbursement dollars

CAUTI

- Symptomatic UTI (SUTI)
  - Criteria dependent on presence or absence of catheter at time of specimen collection
- Asymptomatic Bacteremic UTI (ABUTI)
- Other UTI (OUTI)

Symptomatic UTI – 1a & 1b

Criterion	**Symptomatic Urinary Tract Infection (SUTI)** Must meet at least 1 of the following criteria:
1a	Patient had an indwelling urinary catheter in place at the time of specimen collection *and* at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C), suprapubic tenderness, or costovertebral angle pain or tenderness *and* a positive urine culture of $\geq 10^5$ colony-forming units (CFU)/ml with no more than 2 species of microorganisms. ----------OR---------- Patient had indwelling urinary catheter removed within the 48 hours prior to specimen collection *and* at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C), urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness *and* a positive urine culture of $\geq 10^5$ colony-forming units (CFU)/ml with no more than 2 species of microorganisms.
1b	Patient did not have an indwelling urinary catheter in place at the time of specimen collection nor within 48 hours prior to specimen collection *and* has at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C) in a patient that is ≤65 years of age, urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness *and* a positive urine culture of $\geq 10^5$ CFU/ml with no more than 2 species of microorganisms.

2 Key Questions

- Was an indwelling catheter in place at the time of or within 48 hours prior to the urine specimen collection?
- Is the patient 65 years or older?

Symptomatic UTI – 2a

Patient had an indwelling urinary catheter in place at the time of specimen collection
and
at least 1 of the following signs or symptoms with no other recognized cause:
fever (>38°C), suprapubic tenderness, or costovertebral angle pain or tenderness
and
a positive urinalysis demonstrated by at least 1 of the following findings:

a. positive dipstick for leukocyte esterase and/or nitrite
b. pyuria (urine specimen with ≥10 white blood cells [WBC]/mm^3 or ≥3 WBC/high power field of unspun urine)
c. microorganisms seen on Gram stain of unspun urine

and
a positive urine culture of ≥10^3 and <10^5 CFU/ml with no more than 2 species of microorganisms.

----------OR----------

Patient had indwelling urinary catheter removed within the 48 hours prior to specimen collection
and
at least 1 of the following signs or symptoms with no other recognized cause:
fever (>38°C), urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness
and
a positive urinalysis demonstrated by at least 1 of the following findings:

a. positive dipstick for leukocyte esterase and/or nitrite
b. pyuria (urine specimen with ≥10 white blood cells [WBC]/mm^3 or ≥3 WBC/high power field of unspun urine)
c. microorganisms seen on Gram stain of unspun urine

and
a positive urine culture of ≥10^3 and <10^5 CFU/ml with no more than 2 species of microorganisms.

Symptomatic UTI – 2b

Patient did not have an indwelling urinary catheter in place at the time of specimen collection nor within 48 hours prior to specimen collection

and

has at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C) in a patient that is ≤65 years of age, urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness

and

a positive urinalysis demonstrated by at least 1 of the following findings:

a. positive dipstick for leukocyte esterase and/or nitrite
b. pyuria (urine specimen with ≥10 WBC/mm^3 or ≥3 WBC/high power field of unspun urine)
c. microorganisms seen on Gram stain of unspun urine

and

a positive urine culture of ≥10^3 and <10^5 CFU/ml with no more than 2 species of microorganisms.

SUTI for ≤1 year olds – Criteria 3 & 4

3	Patient ≤1 year of age with or without an indwelling urinary catheter has at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C core), hypothermia (<36°C core), apnea, bradycardia, dysuria, lethargy, or vomiting *and* a positive urine culture of $\geq 10^5$ CFU/ml with no more than 2 species of microorganisms.
4	Patient ≤1 year of age with or without an indwelling urinary catheter has at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C core), hypothermia (<36°C core), apnea, bradycardia, dysuria, lethargy, or vomiting *and* a positive urinalysis demonstrated by at least one of the following findings: a. positive dipstick for leukocyte esterase and/or nitrite b. pyuria (urine specimen with ≥10 WBC/mm^3 or ≥3 WBC/high power field of unspun urine) c. microorganisms seen on Gram's stain of unspun urine *and* a positive urine culture of between $\geq 10^3$ and $<10^5$ CFU/ml with no more than two species of microorganisms.

Asymptomatic Bacteremic UTI (ABUTI)

Patient with or without an indwelling urinary catheter has no signs or symptoms (i.e., for any age patient, no fever (>38°C), urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness, or for a patient ≤1 year of age, no fever (>38°C core), hypothermia (<36°C core), apnea, bradycardia, dysuria, lethargy, or vomiting)
and
a positive urine culture of >105 CFU/ml with no more than 2 species of uropathogen microorganisms*
and
a positive blood culture with at least 1 matching uropathogen microorganism to the urine culture.

* Uropathogen microorganisms are: Gram-negative bacilli, Staphylococcus spp., yeasts, beta-hemolytic Streptococcus spp., Enterococcus spp., G. vaginalis, Aerococcus urinae,and Corynebacterium (urease positive).

CAUTI Cont.

- NHSN analysis options:
  - Line lists
  - Frequency tables
  - Rates with comparable national averages
  - Control charts

Dialysis Event Surveillance

- >309,000 U.S. chronic hemodialysis patients in 2004
- Infection rates by access type:
  - Arteriovenous fistula
  - Arteriovenous grafts
  - Permanent central lines
  - Temporary central lines

Dialysis Event (DE)

- Hospitalization
- Outpatient IV antimicrobial start
- Positive blood culture

Denominator = # patients hemodialyzed at the facility in the first 2 working days of the month

Dialysis Event (DE)

- Analysis Input
  - Hospitalizations
  - Outpatient IV antibiotic starts
  - positive blood culture
- Analysis Output

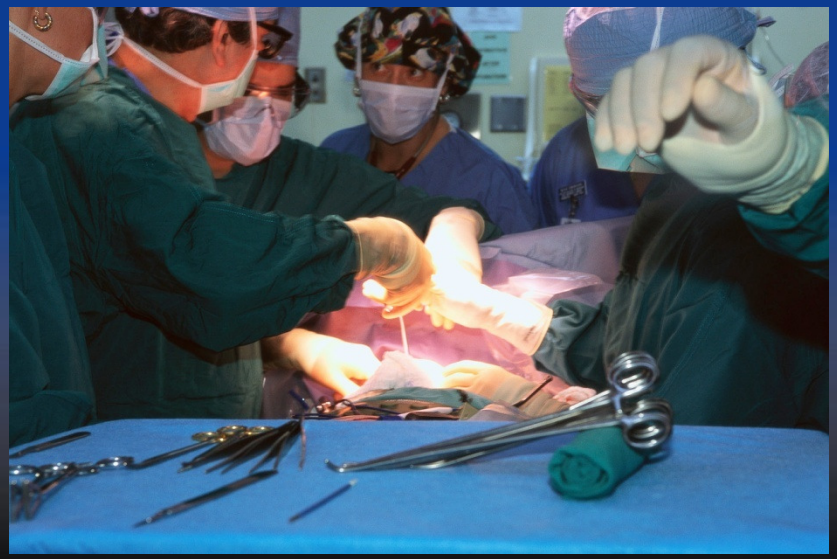
  (Algorithmically derived) rates:
  - Local access infection
  - Access-associated bacteremia
  - Vascular access infection

/100 patient months

Procedure- associated Module

Procedure-associated Module

- Surgical site infection (SSI)
- Post-procedure pneumonia (PPP)



Surgical Site Infection (SSI) Surveillance

- NHSN operative procedure category specific (not associated with location)
- Risk-stratified

- Surgeon-specific optional

NNIS Risk Index

Procedure duration > cut-point	1 point
Wound class III or IV	1 point
ASA score ≥ 3	1 point

0-3 Risk Index Score

Types of SSIs

- Superficial Incisional SSI
  - Occurs within 30 days AND
  - Involves only skin and subcutaneous tissue of incision AND
  - Has at least 1 of:
    - Purulent drainage
    - Positive culture
    - Pain, swelling, redness, OR heat AND incision opened by surgeon and is culture positive or not cx'd

Types of SSIs

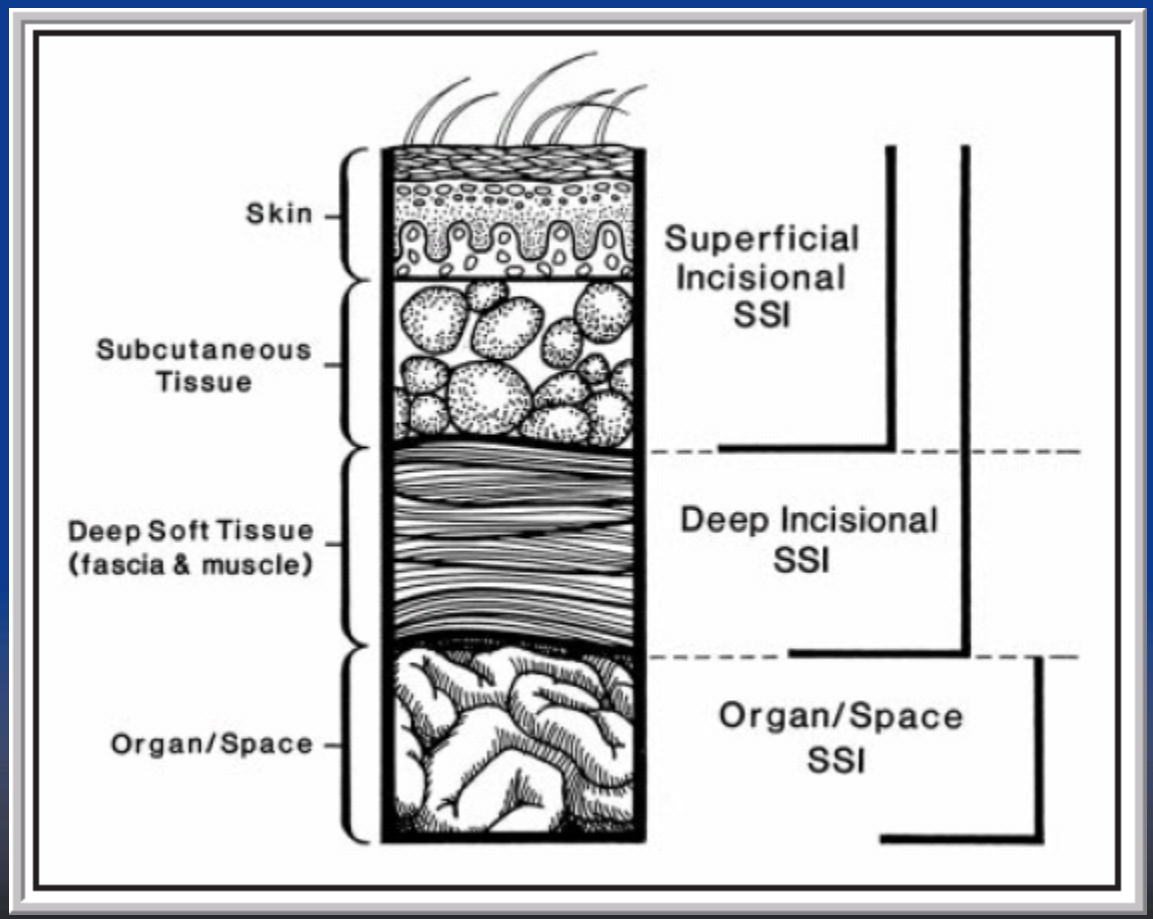
- Deep Incisional SSI
  - Occurs within 30 days (or 1year with implant) AND
  - Involves deep soft tissues (fascial and muscle layers) AND
  - Has at least 1 of:
    - Purulent drainage from deep incision
    - Spontaneous dehiscence or deliberately opened and is culture positive or not cx'd with at least 1 of:
      - Fever (38° C)
      - Pain or tenderness
    - Abscess or evidence of infection by examination, reoperation, histopathologic or radiologic exam

Types of SSIs

- Organ/Space SSI
  - Occurs within 30 days (or 1year with implant) AND
  - infection involves any part of the body, excluding the skin incision, fascia, or muscle layers, that is opened or manipulated during the operative procedure

    AND
  - patient has at least one of the following:
    - purulent drainage from a drain that is placed through a stab wound into the organ/space
    - organisms isolated from an aseptically obtained culture of fluid or tissue in the organ/space
    - an abscess or other evidence of infection involving the organ/space that is found on direct examination, during reoperation, or by histopathologic or radiologic examination
    - diagnosis of an organ/space SSI by a surgeon or attending physician.

Levels of NHSN SSIs



Analysis of SSIs

- Procedure, Risk Stratified rates
  - Number infections/ number procedures
  - Bar charts
  - Graphs
  - Control charts (coming soon)
  - Grouped or stratified by any variables collected
- Surgeon specific rates
- Standardized Infection Ratios (SIRs)

procCode	riskcat	outpatient	summaryYM	SSICount	ProcCount	SSIRate	SSI_Mean	P_pval	P_pctl
CBGB		N	2006M09	0	1	0.00	.	.	.
CBGB		N	2006M12	0	1	0.00	.	.	.
CBGB		N	2007M01	0	3	0.00	.	.	.
CBGB		N	2007M04	0	1	0.00	.	.	.
CBGB		N	2007M05	0	3	0.00	.	.	.
CBGB		N	2007M06	0	3	0.00	.	.	.
CBGB		N	2007M09	0	2	0.00	.	.	.
CBGB		N	2007M10	0	1	0.00	.	.	.
CBGB		N	2007M11	0	1	0.00	.	.	.
CBGB		N	2007M12	0	2	0.00	.	.	.
CBGB	0	N	2008M04	0	1	0.00	0.30	0.9970	.
CBGB	1	N	2006M01	0	6	0.00	2.96	0.8352	10
CBGB	1	N	2006M02	0	6	0.00	2.96	0.8352	10
CBGB	1	N	2006M03	1	8	12.50	2.96	0.2137	100
CBGB	1	N	2006M07	0	6	0.00	2.96	0.8352	10
CBGB	1	N	2006M08	0	6	0.00	2.96	0.8352	10
CBGB	1	N	2006M12	1	6	16.67	2.96	0.1650	100
CBGB	1	N	2007M01	1	7	14.29	2.96	0.1897	100
CBGB	1	N	2007M02	1	7	14.29	2.96	0.1897	100
CBGB	1	N	2007M03	0	6	0.00	2.96	0.8352	10
CBGB	1	N	2007M10	0	7	0.00	2.96	0.8105	10
CBGB	1	N	2008M01	0	1	0.00	2.96	0.9704	10

Post-procedure Pneumonia Surveillance

- Increased incidence in thoracic and abdominal surgeries
- Procedure specific
- Location specific

MDRO & CDAD Surveillance

- Multi-drug resistant organism (MDRO) OR
- *C. difficile*-associated disease (CDAD) LabID Event
- Required:
  - Infection Surveillance OR
  - LabID Event

MDRO & CDAD Surveillance

- Active surveillance testing (AST)
- Hand Hygiene
- Gown and Gloves
- Provides direct and proxy outcome measures
  - E.g., MDRO & CDAD healthcare-associated infection incidence rates
  - E.g., Prevalence and incidence rates based on AST

New Components

Patient Safety

Healthcare Personnel Safety

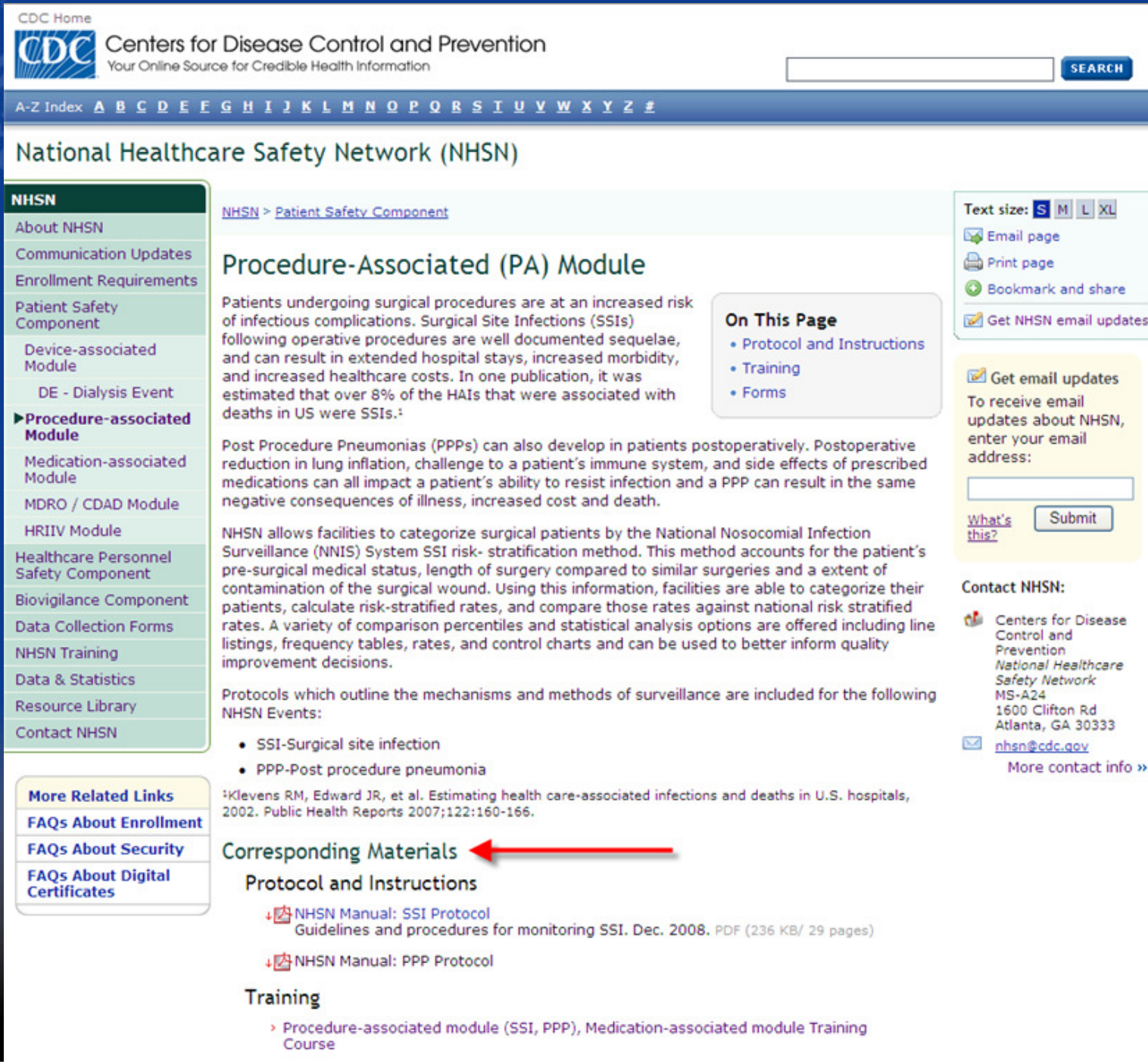
Biovigilance

HCP Safety Surveillance (Fall '09)

- Blood and body fluid exposure
  - Blood and body fluid exposure alone
  - Blood and body fluid exposure with follow up monitoring (laboratory, post-exposure prophylaxis, etc.)
- HCW Vaccination
  - Influenza immunization
  - Seasonal and Novel types

New NHSN Website

www.cdc.gov/NHSN


CDC Home
Centers for Disease Control and Prevention
Your Online Source for Credible Health Information
SEARCH
A-Z Index A B C D E F G H I J K L M N O P Q R S T U V W X Y Z #
National Healthcare Safety Network (NHSN)
NHSN
About NHSN
Communication Updates
Enrollment Requirements
Patient Safety Component
Device-associated Module
DE - Dialysis Event
Procedure-associated Module
Medication-associated Module
MDRO / CDAD Module
HRIIV Module
Healthcare Personnel Safety Component
Biovigilance Component
Data Collection Forms
NHSN Training
Data & Statistics
Resource Library
Contact NHSN
More Related Links
FAQs About Enrollment
FAQs About Security
FAQs About Digital Certificates
NHSN > Patient Safety Component
Procedure-Associated (PA) Module
Patients undergoing surgical procedures are at an increased risk of infectious complications. Surgical Site Infections (SSIs) following operative procedures are well documented sequelae, and can result in extended hospital stays, increased morbidity, and increased healthcare costs. In one publication, it was estimated that over 8% of the HAIs that were associated with deaths in US were SSIs.[1]
On This Page
Protocol and Instructions
Training
Forms
Post Procedure Pneumonias (PPPs) can also develop in patients postoperatively. Postoperative reduction in lung inflation, challenge to a patient's immune system, and side effects of prescribed medications can all impact a patient's ability to resist infection and a PPP can result in the same negative consequences of illness, increased cost and death.
NHSN allows facilities to categorize surgical patients by the National Nosocomial Infection Surveillance (NNIS) System SSI risk- stratification method. This method accounts for the patient's pre-surgical medical status, length of surgery compared to similar surgeries and a extent of contamination of the surgical wound. Using this information, facilities are able to categorize their patients, calculate risk-stratified rates, and compare those rates against national risk stratified rates. A variety of comparison percentiles and statistical analysis options are offered including line listings, frequency tables, rates, and control charts and can be used to better inform quality improvement decisions.
Protocols which outline the mechanisms and methods of surveillance are included for the following NHSN Events:
SSI-Surgical site infection
PPP-Post procedure pneumonia
[1]Klevens RM, Edward JR, et al. Estimating health care-associated infections and deaths in U.S. hospitals, 2002. Public Health Reports 2007;122:160-166.
Corresponding Materials
Protocol and Instructions
NHSN Manual: SSI Protocol
Guidelines and procedures for monitoring SSI. Dec. 2008. PDF (236 KB/ 29 pages)
NHSN Manual: PPP Protocol
Training
Procedure-associated module (SSI, PPP), Medication-associated module Training Course
Text size: S M L XL
Email page
Print page
Bookmark and share
Get NHSN email updates
Get email updates
To receive email updates about NHSN, enter your email address:
What's this?
Submit
Contact NHSN:
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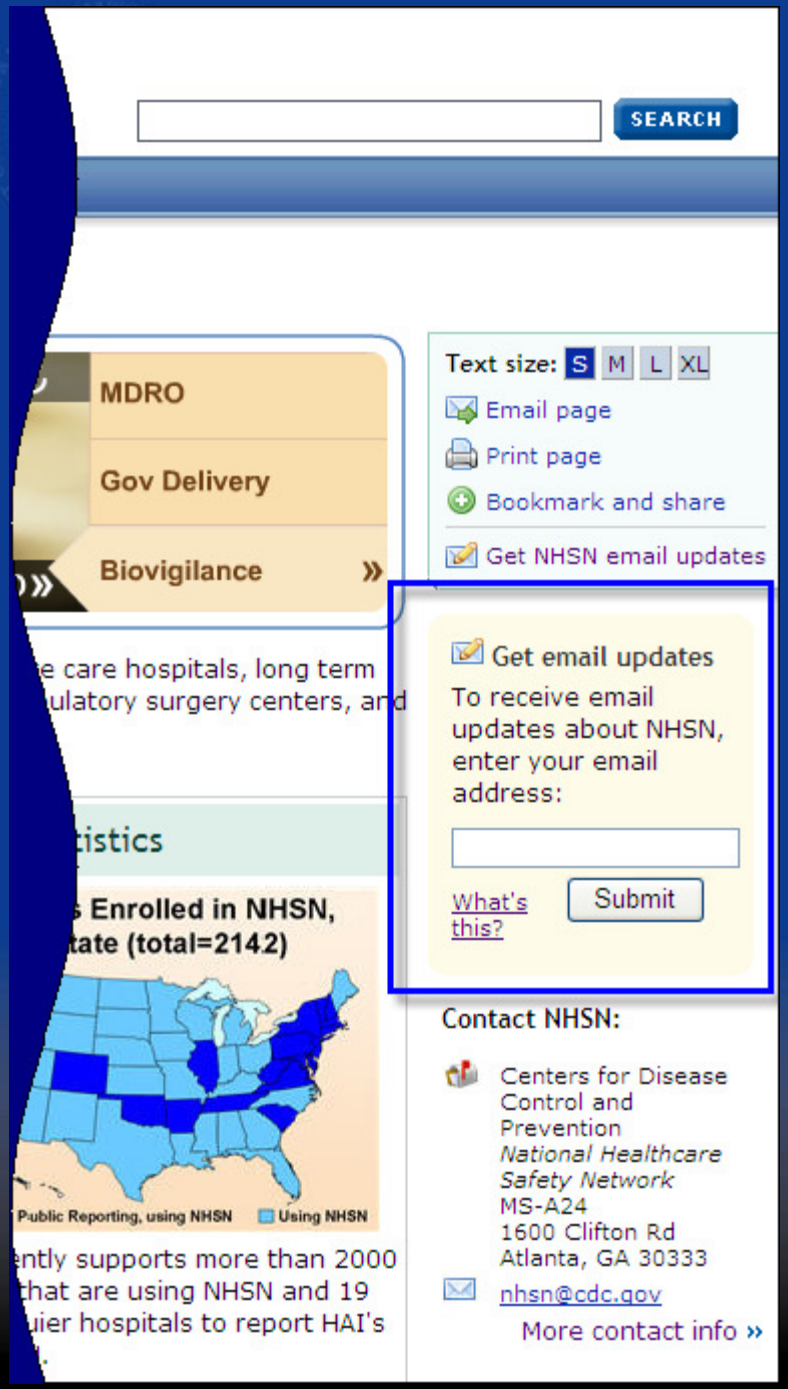
National Healthcare Safety Network
MS-A24
1600 Clifton Rd
Atlanta, GA 30333
nhsn@cdc.gov
More contact info »

Gov Delivery



- Subscription service offered by CDC's website
- Receive email when an NHSN document has been updated or new content has been added
- Optional, but highly recommended for our users
- Can subscribe for other updates from CDC, such as Seasonal Flu updates
- **Available with launch of new NHSN website**

AJIC major articles

National Healthcare Safety Network (NHSN) Report, data summary for 2006 through 2007, issued November 2008

Jonathan R. Edwards, MStat, Kelly D. Peterson, BBA, Mary L. Andrus, BA, RN, CIC, Margaret A. Dudeck, MPH, Daniel A. Pollock, MD, Teresa C. Horan, MPH, and the National Healthcare Safety Network Facilities
Atlanta, Georgia

This report is a summary of device-associated and procedure-associated module data collected and reported by hospitals participating in the National Healthcare Safety Network (NHSN) from January 2006 through December 2007 as reported to the NHSN by

- Estimation of the magnitude of HAIs;
- Discovery of HAI trends;
- Facilitation of inter- and intrahospital comparisons with risk-adjusted data that can be used for local

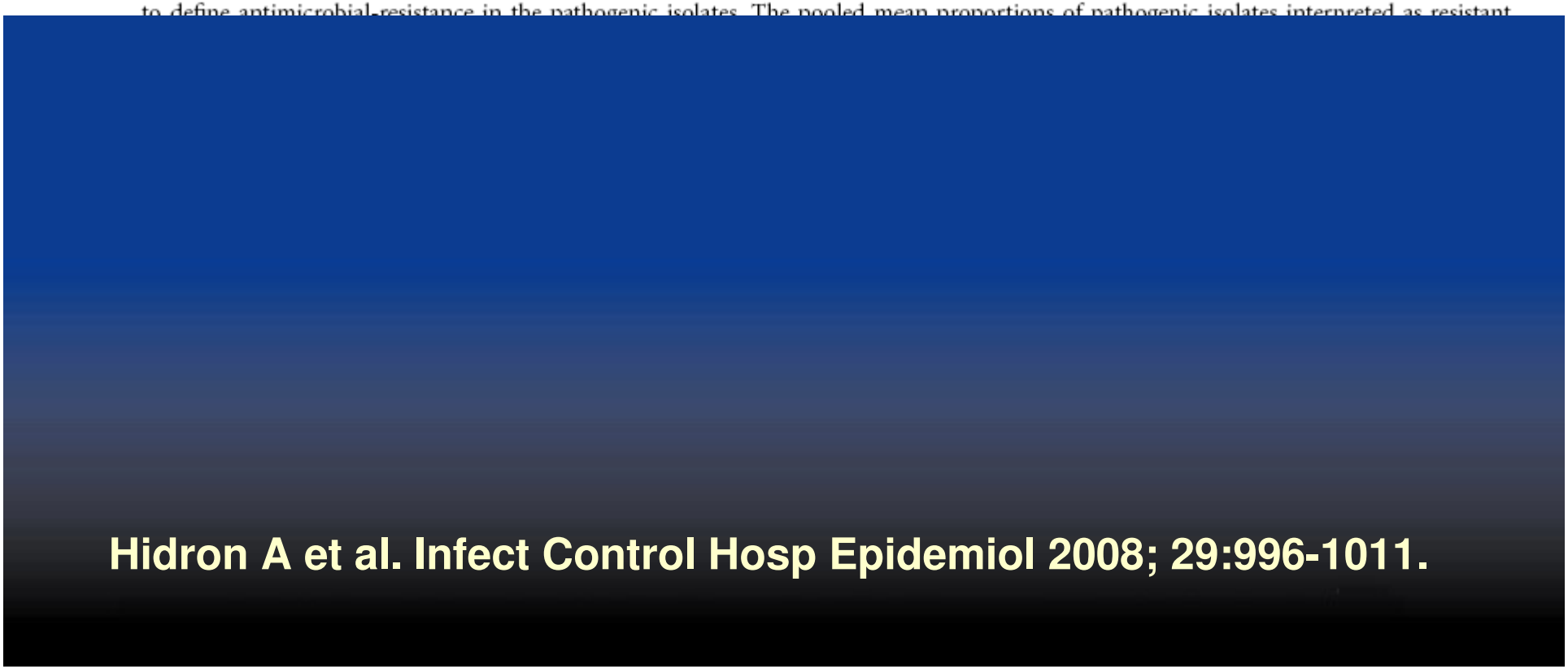
Edwards JR et al. Am J Infect Control 2008;36:609-626.

Reported to the National Healthcare Safety Network at the Centers for Disease Control and Prevention, 2006–2007

Alicia I. Hidron, MD; Jonathan R. Edwards, MS; Jean Patel, PhD; Teresa C. Horan, MPH; Dawn M. Sievert, PhD; Daniel A. Pollock, MD; Scott K. Fridkin, MD; for the National Healthcare Safety Network Team and Participating National Healthcare Safety Network Facilities

OBJECTIVE. To describe the frequency of selected antimicrobial resistance patterns among pathogens causing device-associated and procedure-associated healthcare-associated infections (HAIs) reported by hospitals in the National Healthcare Safety Network (NHSN).

METHODS. Data are included on HAIs (ie, central line–associated bloodstream infections, catheter-associated urinary tract infections, ventilator-associated pneumonia, and surgical site infections) reported to the Patient Safety Component of the NHSN between January 2006 and October 2007. The results of antimicrobial susceptibility testing of up to 3 pathogenic isolates per HAI by a hospital were evaluated to define antimicrobial-resistance in the pathogenic isolates. The pooled mean proportions of pathogenic isolates interpreted as resistant



Hidron A et al. Infect Control Hosp Epidemiol 2008; 29:996-1011.

ORIGINAL CONTRIBUTION

Methicillin-Resistant *Staphylococcus aureus* Central Line–Associated Bloodstream Infections in US Intensive Care Units, 1997-2007

Deron C. Burton, MD, JD, MPH
Jonathan R. Edwards, MStat
Teresa C. Horan, MPH
John A. Jernigan, MD
Scott K. Fridkin, MD

Context Concerns about rates of methicillin-resistant *Staphylococcus aureus* (MRSA) health care–associated infections have prompted calls for mandatory screening or reporting in efforts to reduce MRSA infections.

Objective To examine trends in the incidence of MRSA central line–associated bloodstream infections (BSIs) in US intensive care units (ICUs).

Design, Setting, and Participants Data reported by hospitals to the Centers for Disease Control and Prevention (CDC) from 1997-2007 were used to calculate pooled mean annual central line–associated BSI incidence rates for 7 types of adult and non-neonatal pediatric ICUs. Percent MRSA was defined as the proportion of *S aureus* cen-

STAPHYLOCOCCUS AUREUS IS A common cause of potentially se-

Burton DC et al. JAMA 2009;301(7):727-736.

Save the Date

Fifth Decennial International Conference on Healthcare-Associated Infections

March 18-22, 2010

Hyatt Regency Atlanta
Atlanta, Georgia

www.decennial2010.com

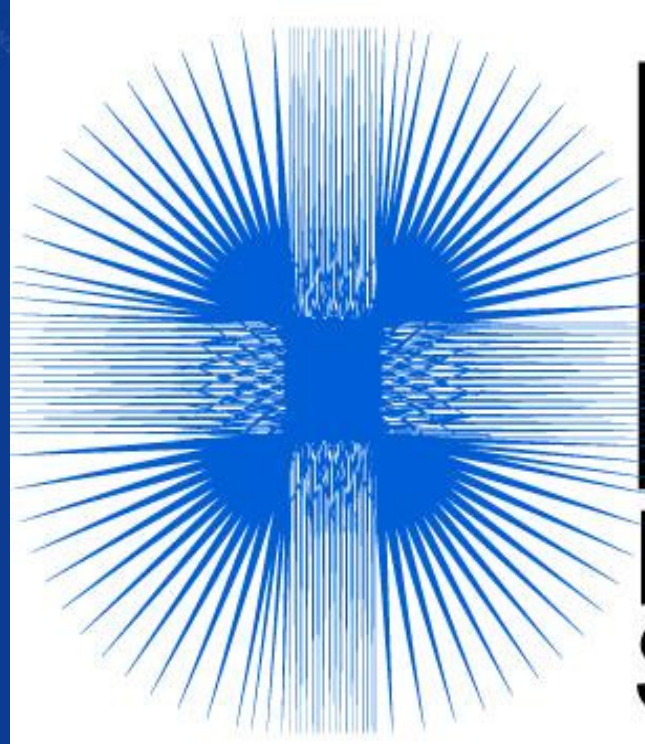
Co-organized by:

SHEA The Society for Healthcare Epidemiology of America

CDC Centers for Disease Control and Prevention

APIC

IDSA



NHSN

National Healthcare Safety Network

http://www.cdc.gov/nhsn/

Email questions to: NHSN@cdc.gov

References

1. O'Grady NP, Alexander M, Dellinger EP, et al. Guidelines for the prevention of intravascular catheter-related infections. Centers for Disease Control and Prevention, MMWR 2002; 51 (no. RR-10): 1-29.
2. Rello J, Ochagavia A, Sabanes E, et al. Evaluation of outcome of intravenous catheter-related infections in critically ill patients. *Am J Respir Crit Care Med* 2000; 162:1027-30.
3. Dimick JB, Pelz RK, Consunji R, Swoboda SM, Hendrix CW, Lipsett PA. Increased resource use associated with catheter-related bloodstream infection in the surgical intensive care unit. *Arch Surg* 2001; 136:229-34.
4. Mermel LA. Prevention of catheter-related infections. *Am Intern Med* 200;132:391-401 {Eratum, *Ann Intern Med* 2000;133:395}.

NHSN

Millie Ayres, MPH, CIC
Renown Regional Medical Center
Reno, Nevada

SB 319

Pennsylvania

- Mandatory Reporting
  - Started with administrative data and house-wide surveillance
  - 2007 switched to NHSN and specific events
- Reporting to Safety
- Patient disclosure within 7 days

SB 319 as Passed

- Mandatory Reporting
- NHSN

NHSN:
Patient Safety Component

- http://www.cdc.gov/nhsn/psc.html
- Mark as your favorite place

NHSN: Resource Library

- Getting Started
  - NHSN User Start Up Guide (application)
  - Training
  - Digital Certificate (annual event)
    - *If you are part of a network, you may need help from your computer department.*
- Joining Groups/Conferring rights

Patient Safety Component

- NHSN Manual (205 pages) for each module:
  - Requirements
  - Definitions
  - Criteria
  - Reporting Instructions
  - Denominator Data

Data Collection Forms

- Enrollment, Annual Facility Survey
- CLABSI, VAP, CAUTI, SSI, MDRO
  - Form Instructions
- Denominators
  - Manual
  - Computer reports

Definitions of Infection

- American Journal of Infection Control 2008:36:309-32
  - Updated UTI definitions follow this section
- Surveillance definitions vs clinical diagnosis

NHSN Program

- Facility: Set up locations
- Monthly Reporting Plan
- Summary Data (denominators)
- Event Data
  - Easy to enter data
  - Quality checks
- Analysis
- Help-On Line Manual

NHSN ANALYSIS

- Generate Data Sets
- Output options
  - CDC defined
    - Line Lists
    - Frequency Table
    - Bar and Pie Chart
    - Control Chart
    - Rate Table

NHSN ANALYSIS

- Output formats
  - PDF (Adobe Acrobat Reader required to view these types of files)
  - CSV (comma separated value, can be viewed with Microsoft Excel)
  - RTF (rich text format, can be viewed with Microsoft Word)

NHSN Reports

- Sent to Critical Care Department Managers and Medical Directors.
- Reviewed in Infection Control Committee and Medical Staff Quality
- Benchmark rates
- Good quality data used to drive change

NV MANDTORY REPORTING

- Administrative codes to be written
  - Opportunity for input
- Will drive our programs
- Concern about resources
- Concern about public reporting of complex data

WE ARE IN THIS TOGETHER

- NETWORKING
  - Share successes
  - Help one another